

Answers to Coursebook exercises

1 Integers, powers and roots

Exercise 1.1 Directed numbers

- 1 a 2 b 4.7 c -5.3 d -0.2 e -2.5
 2 a 1.5 b -3.5 c -5.5 d 5.5 e -2.37
 3 a 11 b -7.4 c 6.6 d -1.1 e -3.3
 4 a 4.1 b 4.7 c -6.1 d -6.9 e -2.13
 5 -1°C
 6 a -2.5 b 0.4 c -6.4 d -9
 7 a -8.1 b 2 c 15.4 d -1

8

+	-3.4	-1.2
5.1	1.7	3.9
-1.3	-4.7	-2.5

- 9 a 22.08 b -9.6 c -2.3 d 44.16 e 4.8
 10 a -8.1 b -0.9 c 1.44 d 13 e -7

11

\times	3.2	-0.6
-1.5	-4.8	0.9
-2.5	-8	1.5

- 12 a 6 b -24 c 1.5
 13 a -10 b -7.5 c 9 d -1.3
 14 a 5.76 b -2.4 c 4.6 d -35
 15 One is 5 and the other is -4. We cannot say which is p and which is q .

Exercise 1.2 Square roots and cube roots

- 1 a $4 < \sqrt{20} < 5$ b $15 < \sqrt{248} < 16$ c $17 < \sqrt{314} < 18$ d $9 < \sqrt{83.5} < 10$ e $12 < \sqrt{157} < 13$
 2 Because $6^3 = 216 < 305$ and $7^3 = 343 > 305$
 3 a 13 b 6 c 20 d 5 e 17
 4 a $4 < \sqrt[3]{100} < 5$ b $6 < \sqrt[3]{222} < 7$ c $9 < \sqrt[3]{825} < 10$ d $6 < \sqrt[3]{326} < 7$ e $3 < \sqrt[3]{58.8} < 4$
 5 a $12^2 = 144 < 160$ and $13^2 = 169 > 160$ b 1600
 6 a 35 b 11
 7 $\sqrt[3]{125} = 5$; $10^2 = 100$ so $\sqrt{125} > 10$
 8 a 25 b 4.5 c 6.8 d 12 e 1.9
 9 a 7.42 b 10.39 c 5.85 d 8.57 e 21.54

Unit 1 Answers to Coursebook exercises

Exercise 1.3 Indices

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|--------------------|-------------------|-------------------|-------------------|-------------------------------------|
| 1 a $\frac{1}{5}$ | b $\frac{1}{25}$ | c $\frac{1}{125}$ | d $\frac{1}{625}$ | |
| 2 a 49 | b $\frac{1}{49}$ | c $\frac{1}{7}$ | d 1 | e 343 |
| 3 a $\frac{1}{4}$ | b $\frac{1}{100}$ | c $\frac{1}{8}$ | d $\frac{1}{12}$ | e $\frac{1}{225}$ f $\frac{1}{400}$ |
| 4 a i 1 | ii 1 | iii 1 | iv 1 | |
| b $a^0 = 1$ | | | | |
| 5 a $1\frac{3}{4}$ | b $13\frac{1}{3}$ | c $3\frac{4}{5}$ | | |
| 6 a 0.2 | b 0.04 | c 0.1 | d 0.01 | e 0.001 |
| 7 a 2^3 | b 2^{-1} | c 2^{-2} | d 2^{-4} | e 2^0 |
| 8 a 2^{11} | b 2^9 | c 2^{-10} | | |

Exercise 1.4 Working with indices

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|--|--|-------------------------|------------------|-------------------|
| 1 a 5^5 | b 6^7 | c 10^6 | d a^7 | e 4^6 |
| 2 a 2^8 | b 8^6 | c a^5 | d 2^6 | e b^7 |
| 3 a 3^3 | b k | c 10^2 | d 5^{-2} | e 7^2 |
| 4 a 2 | b 2^{-1} | c 2^{-2} | d 2^2 | e 2^{-2} |
| 5 a 8^7 | b 5^3 | c 4^6 | d $\frac{1}{9}$ | e $\frac{1}{144}$ |
| 6 a 2 | b -2 | c -3 | d 3 | |
| 7 a 117 649 | b 49 | c 117 649 | d $\frac{1}{7}$ | e 7 |
| 8 a $4^5 \div 4^2 = 4^3$; $5 - 2 = 3$ | b $2^{10} \div 2^4 = 2^6$; $10 - 4 = 6$ | | | |
| 9 a 3^{-2} and 3^{-5} | | | | |
| b i 3^{-7} | ii 3^3 | | | |
| 10 a 2^2 or 4 | b a^3 | c d^3 | d 10^5 | |
| 11 a i 2^4 | ii 2^6 | iii 2^8 | iv 2^{12} | v 2^8 |
| b $(2^m)^n = 2^{mn}$; the index is $m \times n$. | | | | |
| 12 a 4K | b 32K | c $K \times K$ or K^2 | d $\frac{1}{8}K$ | |
| 13 a 2 | b 2 | c 4 | d 6 | |

End-of-unit review

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|---|---------------------------------|----------------------------------|-------------------------------------|
| 1 a 3 | b -2.5 | c -9.2 | d -2.1 |
| 2 a 16 | b -14.7 | c 12 | d 0.1 |
| 3 a 11.25 | b 2.5 | c -5.625 | |
| 4 a -3.6 | b -6.3 | c 2.5 | |
| 5 a $10 < \sqrt{111} < 11$ | b $18 < \sqrt{333} < 19$ | c $4 < \sqrt[3]{111} < 5$ | d $6 < \sqrt[3]{333} < 7$ |
| 6 a 14 | b 6 | | |
| 7 15.8 | | | |
| 8 8.2 | | | |
| 9 $31 < \sqrt{1000} < 32$; $\sqrt[3]{1000} = 10$ and $3 \times 10 = 30$ | | | |
| 10 a 0.5 | b 0.25 | c 0.25 | d 0.04 |
| 11 a $\frac{1}{9}$ | b $\frac{1}{8}$ | c $\frac{1}{6}$ | d $\frac{1}{144}$ |
| 12 a $5\frac{1}{4}$ | b 1001.1 | | |
| 13 a 10^2 | b 10^3 | c 10^{-2} | d 10^{-3} e 10^0 |
| 14 a 9^5 | b 8^3 | c 7^3 | d a^{-2} e n^{-1} |
| 15 a 2^{-1} or $\frac{1}{2}$ | b 15^2 | c 20^2 | d 5^{-2} |
| 16 a a^6 | b a^{-2} | c a^2 | d a^5 e a^{-2} |
| 17 a 4^3 | b a^{-2} | c n | |
| 18 a 0 | b -1 | c 7 | d 2 |